UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/967,142	09/28/2001	Whay S. Lee	P5826 US	4928

7590 05/10/2005

B. Noel Kivlin
Meyertons, Hood, Kivlin, Kowart & Goetzel, P.C.
P.O.Box 398
Austin, TX 78767-0398

EXAMINER	
NG, CHRISTINE Y	

ART UNIT	PAPER NUMBER
2663	

DATE MAILED: 05/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/967,142	LEE ET AL.	
	Examiner	Art Unit	
	Christine Ng	2663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,12,15-21,26,29-35,38 and 41* is/are rejected.

7)☒ Claim(s) *8-11,13,14,22-25,27,28,36,37,39,40,42 and 43* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 September 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/27/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 29 is objected to because of the following informalities:

There are two claim 29's.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 4-7, 15, 18-21, 29 and 32-35 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,606,551 to Kartalopoulos.

Referring to claims 1 and 29, Kartalopoulos discloses in Figure 2 a method of discovering nodes, comprising:

Probing (Figure 5, processes 516,518) an MxN (4x4) torus interconnection fabric, wherein M and N are integer values and said interconnection fabric includes a first plurality (4) of nodes (208) forming an x-axis and a second plurality (4) of nodes (208) forming a y-axis. Refer to Column 3, lines 39-60; and Column 6, line 52 to Column 7, line 41.

Identifying (Figure 5, process 520 and Figures 6-7) a location of a first node relative to the x and y axes. Depending on the information in PPM 410 on the integrity of nodes (Figure 6) or the number of interloop transfers (Figure 7), a first node

determines which path to take through the 4x4 torus to transmit a packet to a destination node. In order to determine the possible paths, a first node must know its own location in the 4X4 torus. Refer to Column 7, line 42 to Column 9, line 61.

Referring to claim 4, 18 and 32, Kartalopoulos discloses in Figure 4 that at least one of the nodes in the interconnection fabric is connected to a storage device. Each node 208 is connected to a performance parameter map (PPM), where stores data and is preferably a table stored in memory. Refer to Column 6, lines 47-51.

Referring to claims 5, 19 and 33, Kartalopoulos discloses in Figure 5 that probing the interconnection fabric comprises sending probe messages from the first node to query a first set of nodes in the interconnection fabric to identify at least one of the first plurality of nodes forming the x-axis and at least one of the second plurality of nodes forming the y-axis. In PPM updating function 518, nodes send (step 508) to the first node performance parameter packets, which the first node uses to update (step 510) its PPM. The packet routing function 520 determines how to best route packets using the information from the updated PPM. The first node receives performance parameter packets from nodes in both x and y axis in order to determine the best route to a destination node. Refer to Column 7, lines 13-48.

Referring to claims 6, 20 and 34, Kartalopoulos discloses in Figure 5 that each of the nodes in the interconnection fabric has an associated origin code (identifier); and said identifying the location of the first node relative to the x and y axes comprises, in response to sending the probe messages from the first node to query the first set of nodes, receiving (self diagnostics function 516) the origin codes from the first set of

nodes. The nodes prepare (step 506) a packet containing the performance parameters and also the identifier (such as the address) of the node sending the packet. The node then broadcasts the packet. Refer to Column 6, line 60 to Column 7, line 12.

Referring to claims 7, 21 and 35, Kartalopoulos discloses in Figure 5 that identifying the location of the first node relative to the x and y axes comprises storing (step 510) the received origin codes form the first set of nodes in a first origin code mapping (PPM 410). The node uses the received performance parameter packet to update its PPM 410. The PPM 410 contains an entry for each node, according to the identifier, in the array and contains performance parameter information for the respective nodes. Refer to Column 7, lines 18-27.

Referring to claim 15, Kartalopoulos discloses in Figure 2 a computer system (Column 6, lines 42-47), comprising:

An MxN (4x4) array of nodes (208), wherein M(4) and N(4) are integer values.

A plurality of interconnects (204,206) connecting the MxN array, wherein:

A first plurality of nodes in the MxN array form an x-axis in the MxN array.

A second plurality of nodes in the MxN array form a y-axis in the MxN array.

A first node in the MxN array is configured to probe the MxN array to identify a location of the first node relative to the x-axis and the y-axis. Refer to the rejection of claims 1 and 29.

Referring to claim 29, Kartalopoulos discloses in Figure 4 that the first node is a CPU node. In each node 208, the "cross connect 402 is controlled by a controller 408, which preferably represents a central processing unit (CPU)..." (Column 6, lines 42-44).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2, 16 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,606,551 to Kartalopoulos in view of U.S. Patent No. 5,513,322 to Hou.

Kartalopoulos does not specifically disclose that probing the MxN torus nterconnection fabric further comprises: determining the number of nodes in the x-direction of the interconnection fabric; and determining the number of nodes in the y-direction of the interconnection fabric.

However, Kartalopoulos disclose that depending on the information in PPM 410 on the integrity of nodes (Figure 6) or the number of interloop transfers (Figure 7) a first node must choose which path to take through the 4x4 torus to transmit a packet to a destination node. In order to consider all paths possible to a destination node, a first node must know the number of nodes in the x-direction and the number of nodes in the y-direction. Refer to the rejection of claim 1. Furthermore, Hou discloses in Figure 2 a packet carrying data that specifies the number of nodes that the message must pass through to reach the destination node in the x-direction and in the y-direction of the array. The total number of nodes in the x-direction and in the y-direction must be determined in case the destination node is located at these points of the array. Refer to

Column 3, lines 44-55. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that probing the MxN torus interconnection fabric further comprises: determining the number of nodes in the x-direction of the interconnection fabric; and determining the number of nodes in the y-direction of the interconnection fabric; the motivation being so that the first node can choose the path with the smallest propagation delay of all possible paths, and send a packet to a node located at the point of the array designated by the number of nodes in the x and y directions.

6. Claims 3, 12, 17, 26, 31 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,606,551 to Kartalopoulos.

Referring to claims 3, 17, and 31, Kartalopoulos does not specifically disclose that after identifying the location of the first node relative to the x and y axes, assigning an identification code to each of the nodes in the interconnection fabric.

However, Kartalopoulos disclose in Figure 2 that each node 208 in the 4x4 torus connection is identified by an identification code (row and column number). Refer to Column 3, line 44-48. The row and column number are relative to the determination of the location of the first node. The row and column number of the first node determines how the rest of the nodes will be numbered, for example, depending on whether or not the node is at the origin. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that after identifying the location of the first node relative to the x and y axes, assigning an identification code to each of

the nodes in the interconnection fabric; the motivation being that the first node establishes a numbering pattern for the rest of the nodes.

Referring to claims 12, 26, and 38, Kartalopoulos does not specifically disclose probing of the interconnection fabric by sending probe messages from a second node to query a second set of nodes in the interconnection fabric to identify at least one of the first plurality of nodes forming the x-axis and at least one of the second plurality of nodes forming the y-axis; and identifying a location of the second node relative to the x and y axes by receiving the origin codes from the second set of nodes. Refer to the rejection of claims 5, 19 and 33 and the rejection of claims 6, 20 and 34.

Kartalopoulos does not specifically disclose that the step is performed by a second node.

However, Kartalopoulos disclose that each node performs the functions shown in Figure 5. Refer to Column 6, line 52-54. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the step of performed by a second node; the motivation being that each node needs to receive updated performance parameters from other nodes of the array in order to determine its location in the array and to determine the shortest path to a destination node in an array.

7. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,606,551 to Kartalopoulos in view of U.S. Patent No. 6,728,214 to Hao et al.

Kartalopoulos discloses a method of discovering nodes, comprising:

Probing an M x N torus interconnection fabric, wherein M and N are integer values and said probing comprises sending probe messages from a first node to query a first set of nodes in the interconnection fabric to identify at least one of a first plurality of nodes forming an x-axis and at least one of a second plurality of nodes forming a y-axis. Refer to the rejection of claims 5, 19 and 33.

Identifying a location of the first node relative to the x and y axes, wherein each of the nodes in the interconnection fabric has an associated origin code and said Identifying comprises, in response to sending the probe messages from the first node to query the first set of nodes, receiving the origin codes from the first set of nodes. Refer to the rejection of claims 6, 20 and 34.

Generating (Figure 2) an observed mapping of the nodes in the interconnection fabric showing a location of a first node relative to an x-axis of the fabric and relative to a y-axis of the fabric based on the origin codes received from the first set of nodes. The first node uses the information received from the performance parameter packets to determine all possible paths to destinations nodes. Refer to Column 7, lines 42-48.

Kartalopoulos does not disclose comparing the observed mapping of the nodes to a set of expected mappings; and identifying the expected mapping which is most similar to the observed mapping.

Hao et al discloses a method for testing a network using different network topologies. A subroutine (route(v_o) and fpacket(v_o)) checks whether or not a router under test responds correctly to a changed network topology through a test executor. The test executor sends topology updates to the router being tested and compares the

updated routing table with a calculated expected routing table to determine whether the updated routing table is correct for each network topology. The test executor compares the observed mapping of nodes (routing table for each topology) to a set of expected mappings (expected routing table for each topology). Hao et al do not specifically disclose identifying the expected mapping which is most similar to the observed mapping. However, the comparison is made to determine whether there is fault in the network, which requires a mapping of the nodes that is most similar to the mapping of the nodes currently being tested. Refer to Column 6, lines 5-14; Column 8, lines 9-17; and Column 10, lines 24-39. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include comparing the observed mapping of the nodes to a set of expected mappings; and identifying the expected mapping which is most similar to the observed mapping; the motivation being in order to determine a mapping of the nodes that is closest to the real mapping of the nodes for testing purposes.

Allowable Subject Matter

8. Claims 8-11, 13, 14, 22-25, 27, 28, 36, 37, 39, 40, 42 and 43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Ng whose telephone number is (571) 272-3124. The examiner can normally be reached on M-F; 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Ng
May 2, 2005

RICKY NGO
PRIMARY EXAMINER

5/5/05